# 1. Introduction

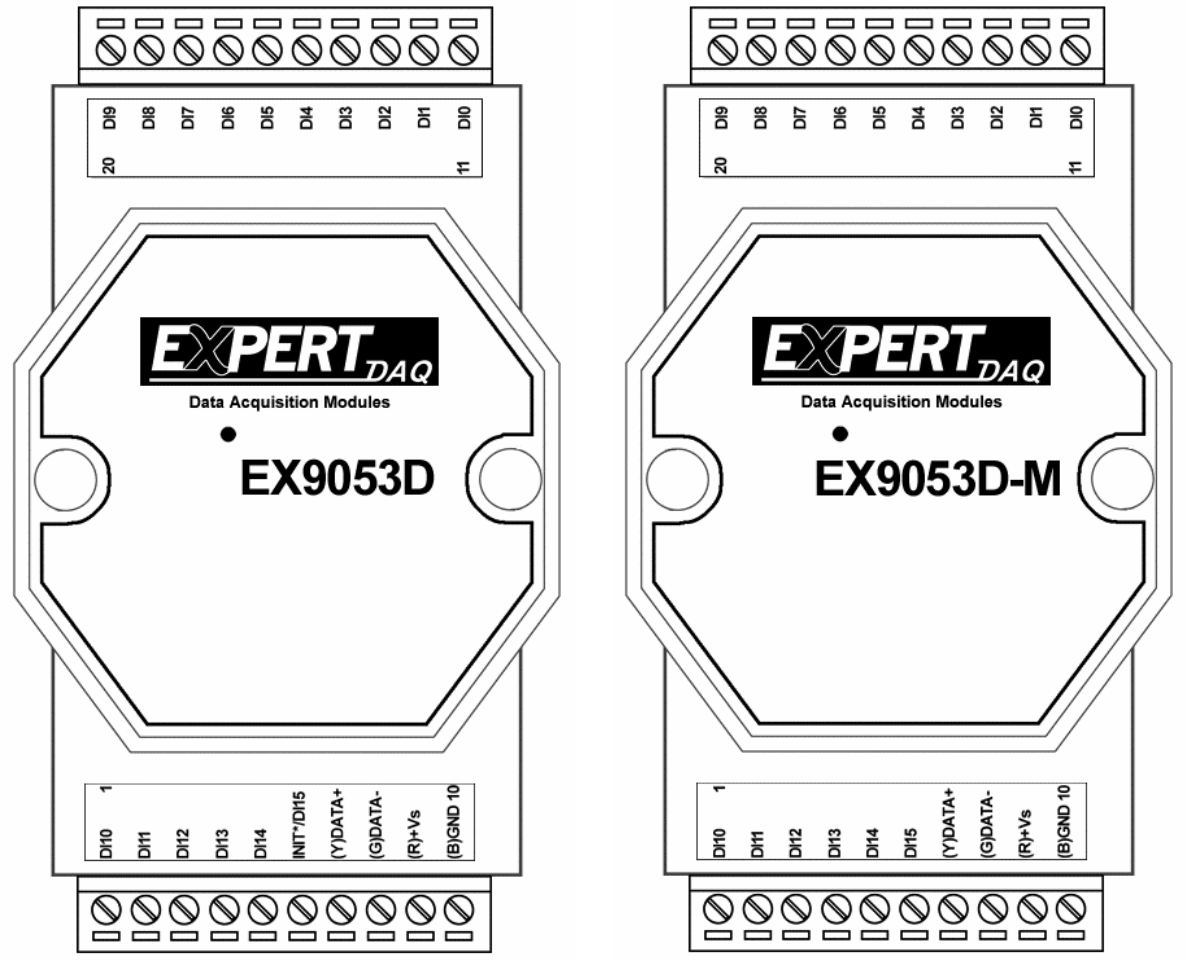
EX-9053D/9053D-M provides 16 non-isolated digital input channels. All input channels are single ended with common ground. (See Sec. 1.2.1 Block diagram)

Specifications

- Interface : RS-485, 2 wires
- Speed : 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K,115.2K
- Input channels : 16 non-isolated input channels (single ended).
- Logical level 0 : +2VDC Max.
- Logical level 1 : +4V ~ +30VDC
- Input impedance : 820 ohms
- LED: 16 digital input status LED
- Power input : +10V to +30VDC
- Power Consumption : 1.7W

# 1.1 Specifications

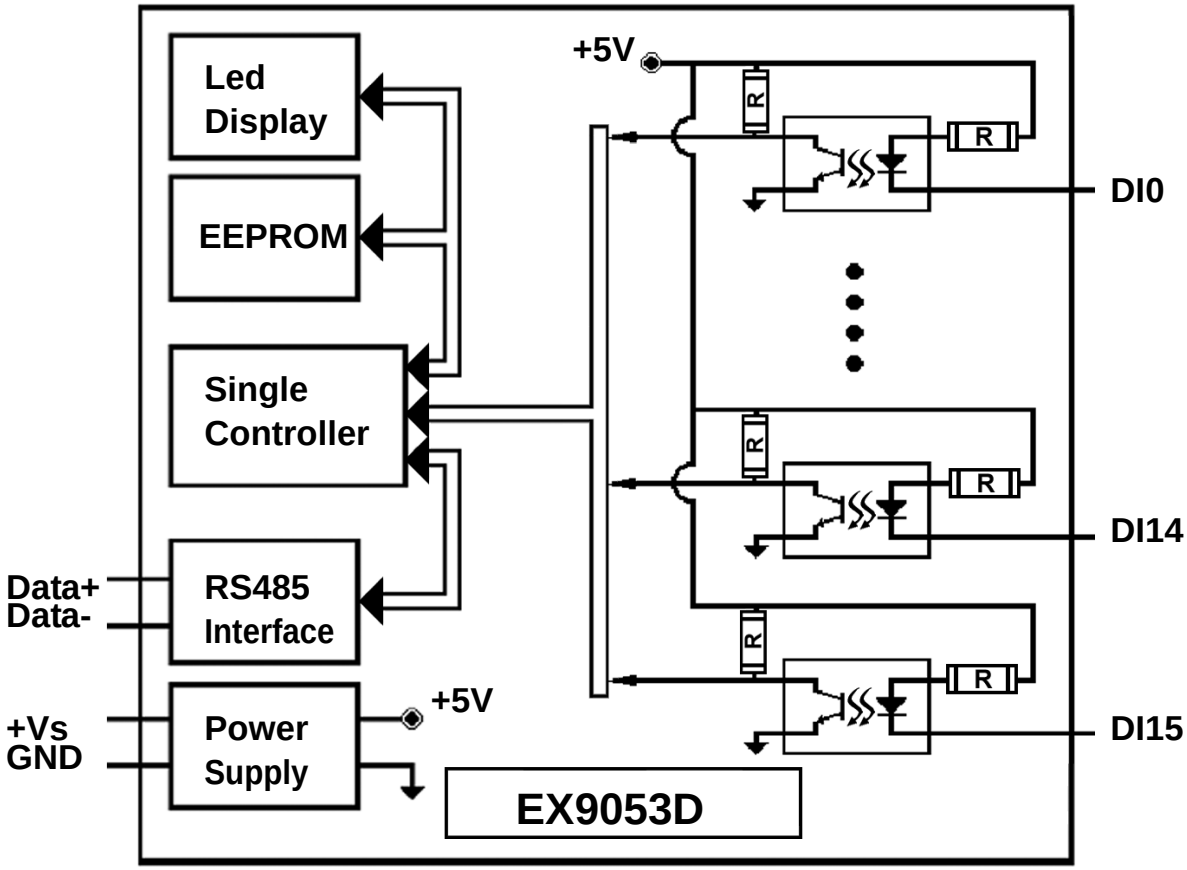
| | EX-9053D | EX-9053D-M |
|---|---|---|
| Input Channels | 16 | |
| Input Type | non-isolated input channels (single ended). | |
| ON Voltage Level | +4 to 30V | |
| OFF Voltage Level | +2V Max | |
| Input Impedance | 820 Ohms | |
| Environment | | |
| Power Requirement | +10 to +30 VDC | |
| Power Consumption | 1.7 W | |
| Modbus RTU | Not support | Support |
| Operating Temperature | -25°C to +75°C | |
| Storage Temperature | -30°C to +75°C | |




**For EX-9053D: Pin-6 are jumper selectable to INIT* or DI15 (Ref. Sec. 1.3)**
**For EX-9053D-M: INIT*( switch) located on the rear side of the module**

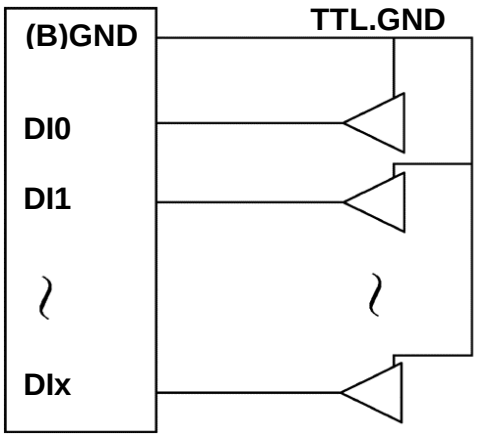
# 1.2 Wire connection

## 1.2.1 Block Diagrams

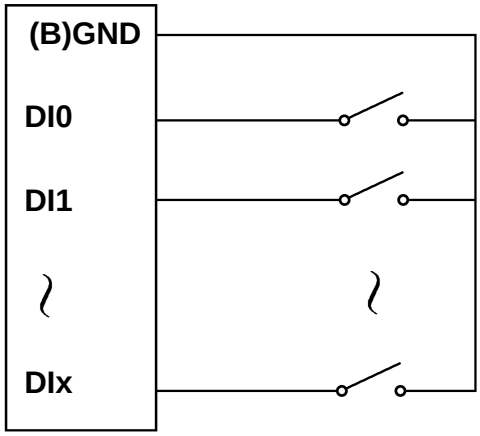


## 1.2.2 Wiring diagram for the EX-9053D/9053D-M

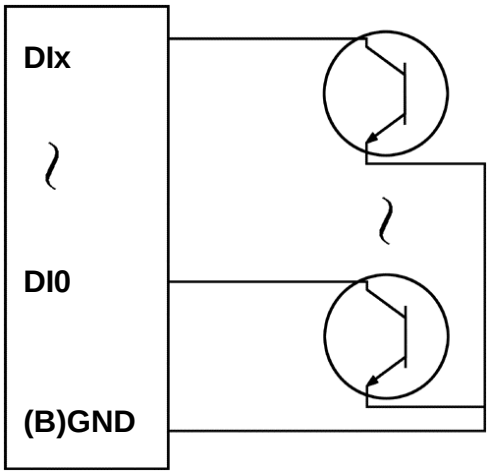
**TTL/CMOS signal I/P**

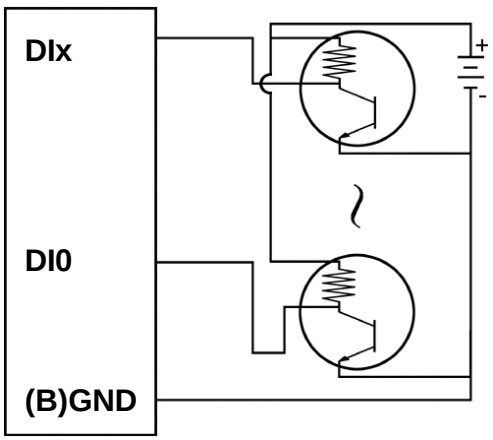



**Dry Contact signal I/P**




**Open Collector signal I/P**



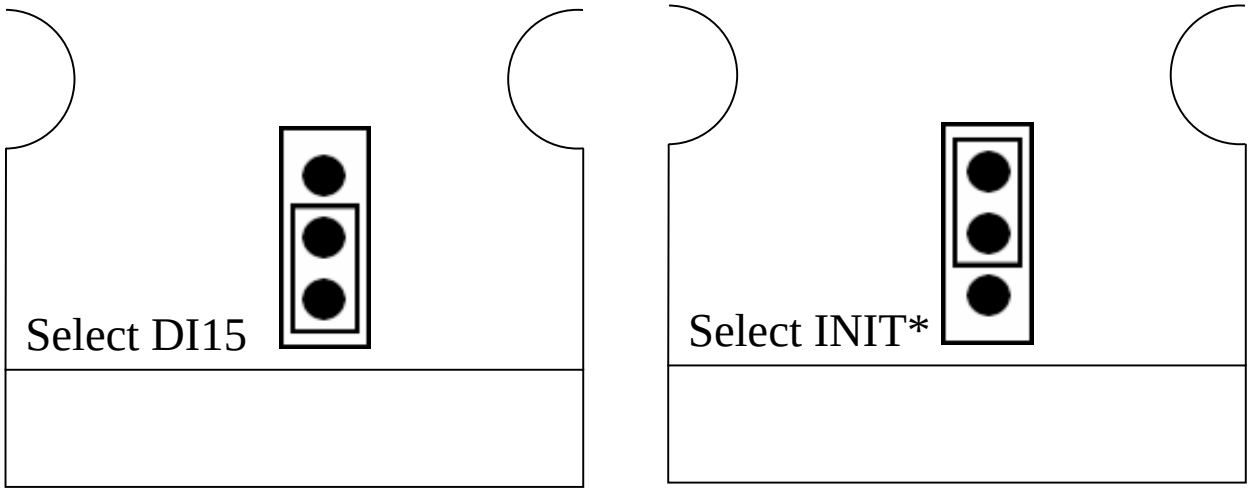



## 1.3 Default Settings

Default settings for the EX-9053D as follows:

. Protocol: ASCII command
. Module Address: 01
. DIO Type: 40
. Baud Rate: 9600 bps

Jumper Setting for select the pin INIT*/DI15



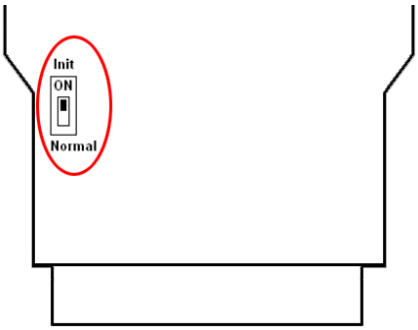

Default settings for the EX-9053D-M as follows:

. Protocol: Modbus RTU
. Module Address: 01
. DIO Type: 40
. Baud Rate: 9600 bps

# 1.4 INIT* Mode Operation

Each EX9000 module has a build-in EEPROM to store configuration information such as address, type, baudrate and other information. Sometimes, user may forget the configuration of the module. Therefore, the EX9000 have a special mode named "INIT* mode" to help user to resolve the problem. The "INIT* mode" is setting as Address=00, Baudrate=9600bps, no Checksum .

Originally, the INIT* mode is accessed by connecting the INIT* terminal to the GND terminal. New EX9000 modules have the INIT* switch located on the rear side of the module to allow easier access to the INIT* mode. For these modules, INIT* mode is accessed by sliding the INIT* switch to the Init position as shown below.




To enable INIT* mode, please following these steps:
Step1. Power off the module
Step2. Connect the INIT* pin with the GND pin.
(or sliding the INIT* switch to the Init* ON position)
Step3. Power on
Step4. Send command $002 (cr) in 9600bps to read the Configuration stored in the module's EEPROM.

There are commands that require the module to be in INIT* mode. They are:
1. %AANNTTCCFF when changing the Baud Rate and checksum settings. See Section 2.1 for details.
2. $AAPN, See Section 2.16 for details.

## 1.5 Module Status for DIO, AIO

**Power On Reset** or **Module Watchdog Reset** will let all output goto **Power On Value**. And the module may accept the host's command to change the output value.

**Host Watchdog Timeout** will let all output goto **Safe Value**. The module's status(read by command~AA0) will be 04, and the output command will be ignored.

## 1.6 Dual Watchdog Operation for DIO, AIO

**Dual Watchdog=Module Watchdog + Host Watchdog**

The Module Watchdog is a hardware reset circuit to monitor the module's operating status. While working in harsh or noisy environment, the module may be down by the external signal. The circuit may let the module to work continues and never halt.

The Host Watchdog is a software function to monitor the host's operating status. Its purpose is to prevent the network from communication problem or host halt. When the timeout interval expired, the module will turn all outputs to predefined Safe Value. This can prevent the controlled target from unexpected situation.

The EX9000 module with Dual Watchdog may let the control system more reliable and stable.

## 1.7 Reset Status

The Reset Status is set while the module power on or reset by module watchdog and is cleared while the command read Reset Status ($AA5) applied. This is useful for user to check the module's working status. When the Reset Status is set means the module is reset and the output may be changed to the PowerOn Value. When the Reset Status is clear means the module is not rested and the output is not changed.

# 1.8 Digital O/P

The module's output have 3 different situation:

<1>**Safe Value**. If the host watchdog timeout status is set, the output is set to Safe Value. While the module receive the output command like @AA(Date) or #AABBDD, the module will ignore the command and return "!". And will not change the output to the output command value. **The host watchdog timeout status is set and store into EEPROM while the host watchdog timeout interval expired and only can be cleared by command ~AA1**. If user want to change the output it need to clear the host watchdog timeout status firstly and send output command to change the output into desired value.

<2>**PowerOn Value**. Only the module reset and the host watchdog timeout status is clear, the module's output is set to predefined Power On Value.

<3> **Output Command Value**. If the host watchdog timeout status is clear and user issue a digital output command like @AA (Data) or #AABBDD to module for changing the output value. The module will response success (receive>).

# 1.9 Latch Digital I/P

For example, use connect the key switch to Digital input channel of a digital input/output module and want to read the key stoke. The Key input is a pulse digital input and user will lost the strike. While reading by command $AA6 in A and B position, the response is that no key stroke and it will lose the key stroke information. Respectely, the read latch low digital input command $AAL0 will solve this problem. When issue $AAL0 command in A and B position, the response denote that there is a low pulse between A and B position for a key stroke.

# 1.10 Configuration Tables

## Baud Rate Setting (CC)

| Code | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 0A |
|---|---|---|---|---|---|---|---|---|
| Baud rate | 1200 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600 | 115200 |

## Data Format Setting (FF)

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| *1 | *2 | 0 | 0 | 0 | 0 | 1 | 1 |

***1**: Counter Update Direction: 0 =Falling Edge,
1=Rising Edge.
***2**: Checksum Bit : 0=Disable, 1=Enable.

Read Digital Input/Output Data Format table

Data of $AA6,$AA4,$AALS:**(First Data)(Second Data)00**

Data of @AA:**(First Data)(Second Data)**

Note: Both the First Data and the Second Data are in two hexadecimal digitals format.

| Module | The First data | | The Second data | |
|---|---|---|---|---|
| EX9053D/53D-M | DI8~DI15 | 00~FF | DI0~DI7 | 00~FF |

# 2.0 Command Sets
# 2.1 %AANNTTCCFF

**Description:** Set Module Configuration.
**Syntax: %AANNTTCCFF[CHK](cr)**

| | |
|---|---|
| % | a delimiter character |
| AA | address of setting/response module(00 to FF) |
| NN | new address for setting/response module(00 to FF) |
| TT | type 40 for DIO module |
| CC | new baudrate for setting module. |
| FF | new data format for setting module. |

If the configuration with new baudrate or new checksum setting, before using this command, it is needed to short the INIT* to ground (or sliding the INIT* switch to the Init ON position of rear side). The new setting is saved in the EEPROM and will be effective after the next power-on reset.

**Response:** Valid Command: !AA
Invalid Command: ?AA

**Example:**

Command: %0102240600 Receive: !02

Set module address 01 to 02, return Success.

## 2.2 #**

**Description:** Synchronized Sampling

**Syntax: #**[CHK](cr)**

# delimiter character

** synchronized sampling command

**Response:** No response

**Example:**

Command: #** No response

Send synchronized sampling command to all modules.

Command: $014 Receive: !10F0000

Read synchronized data from address 01, return S=1, first read and data is 0F0000

Command: $014 Receive: !00F0000

Read synchronized data from address 01, return S=0, have readed and data is 0F0000

## 2.3 #AAN

**Description:** Read Digital Input Counter from channel N

**Syntax : #AAN[CHK](cr)**

| | |
|---|---|
| # | delimiter character |
| AA | address of reading/response module (00 to FF) |
| N | channel to read |

**Response:** Valid Command: >(Data)

Invalid Command: ?AA

(Data) digital input counter value in decimal, from 00000 to 99999

**Example:**

Command: #032 Receive: !0300103

Read address 03 digital input counter value of channel 2, return value 103.

Command: #025 Receive: ?02

Read address 02 digital input counter value of channel 5, return the channel is not available.

## 2.4 $AA2

**Description:** Read configuration.

**Syntax: $AA2[CHK](cr)**

| | |
|---|---|
| $ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| 2 | command for read configuration |

**Response:** Valid Command: **!AATTCCFF**

Invalid Command: **?AA**

| | |
|---|---|
| TT | type code of module, it must be 40 |
| CC | baudrate code of module |
| FF | data format of module |

**Example:**

Command: $012 Receive: !01400600

Read the configuration of module 01, return DIO mode, baudrate 9600, no checksum.

**Note: check configuration Tables**

## 2.5 $AA4

**Description:** Reads the synchronized data

**Syntax: $AA4[CHK](cr)**

| | |
|---|---|
| $ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| 4 | command to read the synchronized data |

**Response:** Valid Command: **!S(Data)**

Invalid Command: **?AA**

| | |
|---|---|
| S | status of synchronized data, 1=first read, 0=been readed |
| (Data) | synchronized DIO value. See Section 1.10 for data format. |

**Example:**

Command: #** no response

Send synchronized sampling to all modules.

Command: $014 Receive: !100F00

Read address 01 synchronized data, return S=1, first read, and synchronized data 0F00

## 2.6 $AA5

**Description:** Read Reset Status

**Syntax: $AA5[CHK](cr)**

| | |
|---|---|
| $ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| 5 | command for read reset status |

**Response:** Valid Command: **!AAS**

Invalid Command: **?AA**

| | |
|---|---|
| S | reset status, 1=the module is been reset, 0=the module is not been rested |

**Example:**

Command: $ 015 Receive: !011

Read address 01 reset status, return module is been reset

Command: $ 015 Receive: !010

Read address 01 reset status, return no reset occurred.

## 2.7 $AA6

**Description:** Read Digital I/O Status

**Syntax: $AA6[CHK](cr)**

| | |
|---|---|
| $ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| 6 | command for read channel status |

**Response:** Valid Command: **!(Data)**

Invalid Command: **?AA**

(Data) Digital input/output value.

**Example:**

Command: $016 Receive: !000F00

Assume module is EX9053, read address 01 DIO status, return 000F, digital input channel 0~3 are on.

## 2.8 $AAF

**Description:** Read Firmware Version

**Syntax: $AAF[CHK](cr)**

| | |
|---|---|
| $ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| F | command for read firmware version |

**Response:** Valid Command: **!AA(Data)**

Invalid Command: **?AA**

(Data) Firmware version of module

**Example:**

Command: $01F Receive: !01D04.03

Read address 01 firmware version, return version D04.03

## 2.9 $AAM

**Description:** Read Module Name

**Syntax: $AAM[CHK](cr)**

| | |
|---|---|
| $ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| M | address of reading/response module(00 to FF) |

**Response:** Valid Command: **!AA(Data)**

Invalid Command: **?AA**

(Data) Name of module

**Example:**

Command: $01M Receive: !019053

Read address 01 module name, return name 9053

## 2.10 $AAC

**Description:** Clear Latched Digital Input

**Syntax: $AAC[CHK](cr)**

| | |
|---|---|
| $ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| C | command for clear latched digital input |

**Response:** Valid Command: **!AA**

Invalid Command: **?AA**

**Example:**

Command: $01L0 Receive: !FFFF00

Read address 01 latch-low data, return FFFF.

Command: $01C Receive: !01

Clear address 01 Latched data, return success.

Command: $01L0 Receive: !000000

Read address 01 latch-low data, return 0000.

## 2.11 $AACN

**Description:** Clear Digital Input Counter

**Syntax: $AACN[CHK](cr)**

| | |
|---|---|
| $ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| C | command for clear latched digital input |
| N | digital counter channel N to clear |

**Response:** Valid Command: **!AA**

Invalid Command: **?AA**

**Example:**

Command: #010 Receive: !0100123

Read address 01 input channel 0 counter value, return 123.

Command: $01C0 Receive: !01

Clear address 01 input channel 0 counter value, return success.

Command: #010 Receive: !0100000

Read address 01 input channel 0 counter value, return 0.

## 2.12 $AALS

**Description:** Read Latched Digital Input

**Syntax: $AALS[CHK](cr)**

| | |
|---|---|
| $ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| L | command for read latched digital input |
| S | 1=select latch high status, 0=select latch low status |

**Response:** Valid Command: **!(Data)**

Invalid Command: **?AA**

(Data) readed status 1=the input channel is latched, 0=the input channel is not latched.

**Example:**

Command: $01L1 Receive: !012300

Read address 01 latch-high data, return 0123.

Command: $01C Receive: !01

Clear address 01 Latched data, return success.

Command: $01L1 Receive: !000000

Read address 01 latch-high data, return 0000.

## 2.13 @AA

**Description:** Read Digital I/O Status

**Syntax: @AA[CHK](cr)**

@ delimiter character

AA address of reading/response module (00 to FF)

**Response:** Valid Command: **>(Data)**

Invalid Command: **?AA**

(Data) Digital input/output value.

**Example:**

Command: @01 Receive: >000F

Assume module is EX9053, read address 01 DIO status, return 000F, digital input channel 0~3 are on

## 2.14 ~AAO(Data)

**Description:** Set Module Name

**Syntax:** **~AAO(Data)[CHK](cr)**

| | |
|---|---|
| ~ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| O | command for set module name |
| (Data) | new name for module, max 6 characters |

**Response:** Valid Command: **!AA**

Invalid Command: **?AA**

**Example:**

Command: ~01O9053 Receive: !01

Set address 01 module name 9053, return success.

Command: $01M Receive: !019053

Read address 01 module name, return name 9053.

## 2.15 $AAP (only for EX9053D-M)

**Description:** Read protocol information of Module

**Syntax: $AAP[CHK](cr)**

| | |
|---|---|
| $ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| P | command for read protocol information of module |

**Response:** Valid Command: **!AAS**

Invalid Command: **?AA**

| | |
|---|---|
| S | The protocol supported by the module<br>10: the protocol set in EEPROM is Normal mode<br>11: the protocol set in EEPROM is ModbusRTU mode |

**Example:**

Command: $01P Receive: !0110

Reads the communication protocol of module 01 and returns a response of 10 meaning the protocol that will be used at the next power on reset is normal mode.

Command: $01P1 Receive: !01

Sets the communication protocol of module 01 to Modbus RTU and returns a valid response. And the next power on reset is in ModbusRTU mode.

## 2.16 $AAPN (only for EX9053D-M)

**Description:** Set the protocol information of Module

**Syntax: $AAPN[CHK](cr)**

| | |
|---|---|
| $ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| P | command for set protocol information of module |
| N | The protocol supported by the module<br>0: the protocol set in EEPROM is Normal mode<br>1: the protocol set in EEPROM is ModbusRTU mode<br>Before using this command, it is needed to short the INIT* to ground (or sliding the INIT* switch to the Init ON position of rear side). The new protocol is saved in the EEPROM and will be effective after the next power-on reset. |

**Response:** Valid Command: **!AA**
Invalid Command: **?AA**

**Example:**

Command: $01P1 Receive: !01

Sets the communication protocol of module 01 to Modbus RTU and returns a valid response. And the next power on reset is in ModbusRTU mode.

## 2.17 ~**

**Description:** Host OK

Host send this command to all modules for send the information “Host OK”

**Syntax: ~**[CHK](cr)**

~ delimiter character

** command for all modules

**Response:** No response

**Example:**

Command: ~** No response

## 2.18 ~AA0

**Description:** Read Module Status

**Syntax: ~AA0[CHK](cr)**

| | |
|---|---|
| ~ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| 0 | command for read module status |

**Response:** Valid Command: **!AASS**

Invalid Command: **?AA**

SS module status, 00= host watchdog is disabled & host watchdog timeout status is clear; 80= host watchdog is enabled & host watchdog timeout status is clear; 84= host watchdog is enabled & host watchdog timeout status is set . The status will store into EEPROM and only may reset by the command~AA1.

| SS | Host watchdog | Host watchdog timeout status |
|---|---|---|
| 00 | Disable | Clear |
| 80 | Enable | Clear |
| 84 | Enable | Set |

## 2.19 ~AA1

**Description:** Reset Module Status

**Syntax: ~AA1[CHK](cr)**

| | |
|---|---|
| ~ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| 1 | command for reset module status |

**Response:** Valid Command: **!AA**

Invalid Command: **?AA**

## 2.20 ~AA2

**Description:** Read the Host Watchdog Timeout Value
**Syntax: ~AA2[CHK](cr)**

| | |
|---|---|
| ~ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| 2 | command for read host watchdog timeout value |

**Response:** Valid Command: **!AAEVV**
Invalid Command: **?AA**

| | |
|---|---|
| E | host watchdog enable status, 1=Enable, 0=Disable |
| VV | timeout value in HEX format, each count is 0.1 second<br>01=0.1 second and FF=25.5 seconds |

## 2.21 ~AA3EVV

**Description:** Set host Watchdog Timeout Value

**Syntax: ~AA3EVV[CHK](cr)**

| | |
|---|---|
| ~ | delimiter character |
| AA | address of reading/response module (00 to FF) |
| 3 | command for set host watchdog timeout value |
| E | 1=Enabled / 0=Disable host watchdog |
| VV | timeout value, from 01 to FF, each for 0.1 second |

**Response:** Valid Command: **!AA**
Invalid Command: **?AA**

**Example:**

Command: ~010 Receive: !0100

Read address 01 modules status, return host watchdog timeout status is clear.

Command: ~013164 Receive: !01

Set address 01 host watchdog timeout value 10.0 seconds and enable host watchdog, return success.

Command: ~012 Receive: !01164

Read address 01 host watchdog timeout value, return that host watchdog is enabled, and time interval is 10.0 seconds.

Command: ~** No response

Reset the host watchdog timer. Wait for about 10 seconds and don't send command~**, the LED of module will go to flash. The flash LED indicates the host watchdog timeout status is set.

Command: ~010 Receive: !0104
Read address 01 module status, return host watchdog timeout status is set.

Command: ~012 Receive: !01064
Read address 01 host watchdog timeout value, return that host watchdog is disabled, and time interval is 10.0 seconds.

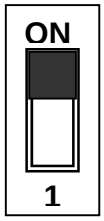
Command: ~011 Receive: !01
Reset address 01 host watchdog timeout status, return success And the LED of this module stop flash.

Command: ~010 Receive: !0100
Read address 01 module status, return host watchdog timeout status is clear.

# EX9053-M Quick Start

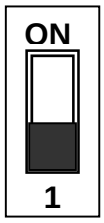
**1. The default setting is MODBUS mode after Power On.**

**2. Sliding the INIT* switch to the Init*(ON) position of rear side then Power On will enter INIT* mode (use ASCII command).**




**3. On ASCII command mode, user can set other setting like Address, Baudrate, …by use ASCII command or Utility of EX9000 (Please check the User Manual of EX9000).**

**4. After change the setting finished, Sliding the INIT* switch to the Normal(1) position of rear side, the new setting will be effective after the next power-on reset.**



# 01(0x01) Read Digital Input Value

### Request

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x01 |
| 02~03 | Starting channel | 2 Bytes | 0x0020~0x002F for DI readback value<br>0x0040~0x004F for DI Latch high value<br>0x0060~0x006F for DI Latch low value |
| 04~05 | channel numbers | 2 Bytes | 0x0001~0x0010 |

### Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x01 |
| 02 | Byte count | 1 Byte | 1 |
| 03 | Input/Output channel readback value | 1 Byte | 0x00~0x0F<br>A bit corresponds to a channel. When the bit is 1 it denotes that the value of the channel that was set is ON. if the bit is 0 it denotes that the value of the channel that was set is OFF. |

### Error Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x81 |
| 02 | Exception code | 1 Byte | Refer to the Modbus standard for more details. |

# 02(0x02) Read Digital Input Value

### Request

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x02 |
| 02~03 | Starting channel | 2 Bytes | 0x0000~0x000F |
| 04~05 | channel numbers | 2 Bytes | 0x0001~0x0010 |

### Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x02 |
| 02 | Byte count | 1 Byte | 1 |
| 03 | Input channel readback value | 1 Byte | 0x00~0x0F<br>A bit corresponds to a channel. When the bit is 1 it denotes that the value of the channel that was Input response. if the bit is 0 it denotes that the value of the channel that was no Input response . |

### Error Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x82 |
| 02 | Exception code | 1 Byte | Refer to the Modbus standard for more details. |

# 03(0x03) Read Digital Input Count Value

### Request

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x03 |
| 02~03 | Starting channel | 2 Bytes | 0x0000~0x000F |
| 04~05 | channel numbers | 2 Bytes | 0x0001~0x0010 |

### Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x03 |
| 02 | Byte count | 1 Byte | 1 |
| 03~ | Input channel count value | **N*** x 2 Byte | Each channel can record a maximum count value up to 65535(0xFFFF). |

**N*=Number of input channels**

### Error Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x83 |
| 02 | Exception code | 1 Byte | Refer to the Modbus standard for more details. |

# 04(0x04) Read Digital Input Count Value

### Request

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x04 |
| 02~03 | Starting channel | 2 Bytes | 0x0000~0x000F |
| 04~05 | channel numbers | 2 Bytes | 0x0001~0x0010 |

### Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x04 |
| 02 | Byte count | 1 Byte | 1 |
| 03~ | Input channel count value | **N*** x 2 Byte | Each channel can record a maximum count value up to 65535(0xFFFF). |

**N*=Number of input channels**

### Error Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x84 |
| 02 | Exception code | 1 Byte | Refer to the Modbus standard for more details. |

# 05(0x05) Clear DI count Value (Single channel)

## Request

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x05 |
| 02~03 | channel number | 2 Bytes | 0x0107 to clear the latch value<br>0x0200~0x020F to clear the DI counter value |
| 04~05 | Clear DI count value | 2 Bytes | A value of 0xFF00 sets the output to ON. A value of 0x0000 set it to OFF. All other values are illegal and won't affect the coil. |

## Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x05 |
| 02~03 | Output channel numbers | 2 Bytes | The value is the same as byte 02 and 03 of the Request |
| 04~05 | Output value | 2 Bytes | The value is the same as byte 04 and 05 of the Request |

## Error Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x85 |
| 02 | Exception code | 1 Byte | Refer to the Modbus standard for more details. |

# 15(0x0F) Clear DI count Value (Multi channel)

## Request

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x0F |
| 02~03 | Starting channel | 2 Bytes | 0x0200~0x020F to clear the DI counter value |
| 04~05 | channel numbers | 2 Bytes | 0x0001~0x0010 |
| 06 | Byte count | 1 Byte | 2 |
| 07 | Clear DI count value | 1 Byte | 0x0000~0xFFFF<br>A bit corresponds to a channel. When the bit is 1 it denotes that the value of the channel that was set is ON. if the bit is 0 it denotes that the value of the channel that was set is OFF. |

## Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x0F |
| 02~03 | Starting channel | 2 Bytes | The value is the same as byte 02 and 03 of the Request |
| 04~05 | Output channel numbers | 2 Bytes | The value is the same as byte 04 and 05 of the Request |

## Error Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x8F |
| 02 | Exception code | 1 Byte | Refer to the Modbus standard for more details. |

# 01(0x01) Read WDT timeout status

## Request

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x01 |
| 02~03 | Starting channel | 2 Bytes | 0x010D |
| 04~05 | Output channel numbers | 2 Bytes | 0x0001 |

## Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x01 |
| 02 | Byte count | 1 Byte | 1 |
| 03 | Output channel readback value | 1 Byte | 0x00 The WDT timeout status is clear<br>0x01 The WDT timeout status is enable |

## Error Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x81 |
| 02 | Exception code | 1 Byte | Refer to the Modbus standard for more details. |

# 03(0x03) Read WDT timeout Value

## Request

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x03 |
| 02~03 | Starting channel | 2 Bytes | 0x01E8 |
| 04~05 | Input channel numbers | 2 Bytes | 0x0001 |

## Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x03 |
| 02 | Byte count | 1 Byte | 2 |
| 03~ | Input channel count value | **1** Byte | 0x0000~0x00FF WDT timeout value, 0~255, in 0.1 second |

## Error Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x83 |
| 02 | Exception code | 1 Byte | Refer to the Modbus standard for more details. |

# 03(0x03) Send Host OK

### Request

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x03 |
| 02~03 | Starting channel | 2 Bytes | 0x3038 |
| 04~05 | Input channel numbers | 2 Bytes | 0x0000 |

### No Response

# 04(0x04) Send Host OK

### Request

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x04 |
| 02~03 | Starting channel | 2 Bytes | 0x3038 |
| 04~05 | Input channel numbers | 2 Bytes | 0x0000 |

### No Response

# 05(0x05) Set WDT timeout /Clear WDT timeout status

### Request

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x05 |
| 02~03 | Output channel number | 2 Bytes | 0x0104 Set WDT timeout enable/disable<br>0x010D Clear WDT timeout status |
| 04~05 | Output value | 2 Bytes | 0xFF00 for WDT timeout enable<br>0x0000 for WDT timeout disable<br>0xFF00 for Clear WDT timeout status |

### Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x05 |
| 02~03 | Output channel numbers | 2 Bytes | The value is the same as byte 02 and 03 of the Request |
| 04~05 | Output value | 2 Bytes | The value is the same as byte 04 and 05 of the Request |

### Error Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x85 |
| 02 | Exception code | 1 Byte | Refer to the Modbus standard for more details. |

# 06(0x06) Set WDT timeout Value

### Request

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x06 |
| 02~03 | Starting channel | 2 Bytes | 0x01E8 |
| 04~05 | Input channel numbers | 2 Bytes | 0x0000~0x00FF WDT timeout value, 0~255, in 0.1 second |

### Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x06 |
| 02~03 | Output channel numbers | 2 Bytes | The value is the same as byte 02 and 03 of the Request |
| 04~05 | Output value | 2 Bytes | The value is the same as byte 04 and 05 of the Request |

### Error Response

| | | | |
|---|---|---|---|
| 00 | Address | 1 Byte | 1-247 |
| 01 | Function code | 1 Byte | 0x86 |
| 02 | Exception code | 1 Byte | Refer to the Modbus standard for more details. |

## Modbus Mapping Table:

## EX9053M (DI*16)

| ADDR | Item | Attribute |
|---|---|---|
| 00033~00048 | Digital Input channel for DI0~15 | R |
| | | |
| 00065~00080 | DI Latch high value for DI0~15 | R |
| 00097~00112 | DI Latch low value for DI0~15 | R |
| 00264 | Clear the Latch value | W |
| | | |
| 30001~30016 | Digital input counter for DI0~15 | R |
| 00513~00528 | Clear the DI counter value for DI0~15 | W |